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PROCEDURE

CONSOLIDATED WATER TREATMENT FACILITY
CHEMICAL HANDLING AND MIXING OPERATIONS

RMRS/OPS-PRO-CWTF.171
Revision 0
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1.0 PURPOSE

This procedure describes the administrative and operational steps used at Rocky Flats Environmental Technology Site (RFETS) for process chemical handling for the Consolidated Water Treatment Facility (CWTF) treatment system equipment contained in Trailers T900A and T900B.

2.0 SCOPE

This procedure applies to all personnel involved in the operation of the Consolidated Water Treatment Facility.

This procedure addresses the following topics:

- Filling and adding chemicals to Ferric Sulfate Tank TK-4;
- Filling and adding chemicals to Sulfuric Acid Tank TK-5;
- Filling and adding chemicals to Lime Slurry Tank TK-6;
- Filling and adding chemicals to Dilute Sulfuric Acid Tank TK-21;

This document supersedes, *Chemical Handling and Mixing Operations, Consolidated Water Treatment Facility,* 4-I63-ENV-OPS-FO.45, Revision 1.

3.0 OVERVIEW

This procedure implements the requirements for safe chemical handling for the Chemical Precipitation/Microfiltration (CP/MF) treatment equipment at the CWTF.

This procedure was established to ensure that chemical handling operations for the preparation of process chemicals for the CP/MF treatment system are accomplished in a uniform and safe manner.

This procedure is used by the operator(s) during all chemical handling operations at the CP/MF treatment system.

4.0 LIMITATIONS AND PRECAUTIONS

Extreme care shall be taken whenever chemicals are stored and dispensed.

The CWTF Health and Safety Plan (HASP) identifies hazards associated with operation of the CWTF and delineates control measures necessary to minimize the risk to personnel from these hazards.

Water shall always be added prior to adding chemicals to the chemical storage/mixing tanks.

Operators WILL be aware that Material Safety Data Sheets are on file in the Building 891 Office for all chemicals used at the CWTF and should be reviewed, as necessary, prior to handling.

Chemical handling and mixing operations requires a minimum of one qualified operator with a "buddy" possessing sufficient knowledge and experience to identify abnormal situations and the ability to summon the Facility Manager or emergency response personnel if necessary.

When filling a tank, the filling operator shall not leave the vicinity of the tank and shall ensure that the tank is not overfilled by visually monitoring tank level.

Tank fill valves (manual valves-MV) shall be opened and closed carefully. Placing automatic valves (AV) to HAND results in immediate opening of the valve.

All metering pump hoses must be secured prior to pump operation to minimize the potential for spray of chemicals.

5.0 PREREQUISITE ACTIONS

CWTF Responsible Manager

[1] Ensure that chemical mixing and handling operations are on the Plan of the Day (POD).

[2] Brief personnel on the implementation of this procedure. Ensure that personnel understand their responsibilities to comply with procedural requirements and actions to take should compliance with this procedure become impossible.

Facility Operator / "Buddy"

[1] Ensure that a briefing by the Facility Manager or designee regarding implementation of this procedure is performed.

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[2] Reports abnormal conditions, occurrences, and incidents to the Responsible Manager.

[3] Completes the required entries in the following logs and forms: CWTF Logbook, the CWTF Chemical Logbook, and applicable forms.

[4] Ensure that all required tools, materials, personal protective equipment, etc. necessary to perform actions delineated in this procedure and the facility HASP are present.

[5] Ensure that at least one member of the operating team (operator or "buddy") possess a functional radio capable of alerting other facility personnel to abnormal situations and/or summoning emergency response personnel.

[6] Operate and monitor the CP/MF system equipment.

Health and Safety Specialist/Designee

[1] Ensure that personnel are aware of the hazards associated with performing the actions delineated in this procedure. Ensure that personnel have been briefed on the requirements of the Facility HASP and are capable of effectively implementing prescribed hazard controls.

6.0 INSTRUCTIONS

6.1 Filling Ferric Sulfate Tank TK-4

Operator

[1] The normal starting operating range for FERRIC SULFATE TANK TK-4 is from 15 to 50 gallons (approximately 1.7 gallons per inch in TK-4). **IF** TK-4 contains less than 15 gallons, **THEN** add Ferric Sulfate to bring the tank level (tank level is indicated in one-inch increments on the side of the tank) to within the normal starting range outlined below:

[A] Place the switch on the mixer motor for MX-4 (FERRIC SULFATE SLURRY TANK TK-4 MIXER) to the ON position and observe mixer shaft turning. The MIXER MX-4 switch is located on top of the mixer in T900B.

[B] Verify the following manual valves in T900A are CLOSED:
- MV-924
- MV-929
- MV-939
- MV-998
- MV-999

- AV-914 (Hand/Off/Auto [HOA] switch should be OFF at the control panel).

[C] Verify the following manual valves in T900B are CLOSED:
- MV-947
- MV-961
- MV-962 (water spigot)
- MV-963
- MV-985
- MV-988

[D] In T900A OPEN the following manual valves:
- MV-925
- MV-938
- MV-999 (½ open)

[E] In T900B OPEN manual valve MV-959.

[F] In T900A, place the FILTRATE TRANSFER PUMP TP-11-1 control switch to HAND.

[G] Fill FERRIC SULFATE SLURRY TANK TK-4 with water from NEUTRALIZATION TANK TK-11 to the desired level.

[2] When the desired level in TK-4 is reached;

[A] CLOSE manual valve MV-959 in T900B.

[B] Place the FILTRATE TRANSFER PUMP TP-11-1 control switch to OFF.

[C] In T900A, CLOSE manual valves MV-938 and MV-999.

[3] In T900B, place a clean plastic bucket on the scale, and measure into the bucket the appropriate amount of ferric sulfate for the intended addition. The mixing ratio is 1 pound of ferric sulfate to 1 gallon of water.

[4] Slowly add pre-measured ferric sulfate to TK-4. Examine the texture of the dry ferric sulfate before and during this process. Break up any lumps to prevent splashing during the addition, and plugging of the metering pump suction.

[5] Allow the mixer MX-4 in Tank TK-4 to run for at least 10 minutes to ensure proper chemical mixing.

6.2 Filling 20% Sulfuric Acid Tank TK-5

Operator

[1] The normal starting operating range for 20% SULFURIC ACID TANK TK-5 is from 50% to 90% of the tank capacity. **IF** TK-5 is less than 50% full, **THEN** add a sufficient amount of water and concentrated sulfuric acid to bring the tank level to within the normal starting range in accordance with the following;

NOTE 1 *A tape measure may be used for estimating the liquid level in TK-5. The working capacity for TK-5 is approximately 250 gallons (approximately 6 gallons per inch in TK-5).*

CAUTION

When filling 20% SULFURIC ACID TANK TK-5, be sure to leave enough room in TK-5 for addition of concentrated sulfuric acid, after adding the water.

CAUTION

Liquid level must be above mixer blade to minimize splashing chemicals. Add the sufficient amount of water to the tank before energizing mixer.

[A] Verify the following manual valves in T900A are CLOSED:
- MV-924
- MV-929
- MV-939
- MV-998
- MV-999
- AV-914 (HOA switch should be OFF at the control panel).

[B] Verify the following manual valves in T900B are CLOSED:
- MV-947
- MV-961
- MV-962 (water spigot)
- MV-985
- MV-988

[C] In T900A OPEN the following manual valves:
- MV-925
- MV-938
- MV-999 (½ open)

[D] In T900B OPEN manual valve MV-963.

[E] In T900A, place the FILTRATE TRANSFER PUMP TP-11-1 control switch to HAND.

[F] Fill 20% SULFURIC ACID TANK TK-5 with water from NEUTRALIZATION TANK TK-11 to the desired level.

[2] When the desired level in TK-5 is reached;

[A] CLOSE manual valve MV-963 in T900B.

[B] Place the FILTRATE TRANSFER PUMP TP-11-1 control switch to OFF.

[C] In T900A, CLOSE manual valves MV-938 and MV-999.

[3] WHEN adding sulfuric acid to 20% SULFURIC ACID TANK TK-5 from the CONCENTRATED SULFURIC ACID TANK TK-20, FIRST follow steps 6.3 [1] through [3] to add water into TK-5, THEN:

[A] Check the initial tank level of TK-20 on the local level indicator on the tank to verify an adequate supply of acid is in tank.

[B] At TK-20, ensure manual valve MV-9007 is CLOSED.

[C] At TK-20, OPEN manual valves:
- MV-9004
- MV-9005
- MV-9015

[D] Determine the proper amount of concentrated sulfuric acid to transfer. In TK-5, add approximately 1" of 98% concentrated sulfuric acid for every 4" of water to prepare a ~20% solution.

[E] Plug ACID METERING PUMP MP-20-1 into the 120-volt receptacle at tank TK-20.

[F] Turn ACID METERING PUMP MP-20-1 switch to ON and pump desired amount of sulfuric acid into TK-5. Switch is located on the pump.

[G] Visually monitor the TK-5 level to determine when the desired amount of concentrated sulfuric acid has been pumped, THEN turn Pump MP-20-1 switch to OFF.

[H] Unplug METERING PUMP MP-20-1 from the 120-volt receptacle.

[I] CLOSE manual valves:

-MV-9004
-MV-9015

[J] OPEN manual valve MV-9007.

[4] On the T900B Control Panel, place the Mixer MX-5 control switch to ON.

[5] Place the mixer MX-5 switch to OFF after sufficient (approximately 5 minutes) mixing time has elapsed.

6.3 Filling Lime Slurry Tank TK-6

Operator

[1] The normal starting operating range for LIME SLURRY TANK TK-6 is from 50% to 90% of the tank capacity. **IF** TK-6 is less than 50% full, **THEN** add a sufficient amount of water and hydrated lime to bring the tank level to within the normal starting range in accordance with the following;

NOTE 1 *A tape measure may be used for estimating the liquid level in TK-6. The working capacity for TK-6 is approximately 250 gallons (approximately 6 gallons per inch in TK-6).*

[A] Verify the following manual valves in T900A are CLOSED:
- MV-924
- MV-929
- MV-939
- MV-998
- MV-999
- AV-914 (HOA switch should be OFF at the control panel)

[B] Verify the following manual valves in T900B are CLOSED:
- MV- 947
- MV-959
- MV-962 (water spigot)
- MV-963
- MV-985
- MV-988

[C] In T900A OPEN the following manual valves:
- MV-938
- MV-999 (½ open)

[D] In T900B OPEN manual valve MV-961.

[E] In T900A, place the FILTRATE TRANSFER PUMP TP-11-1 control

switch to HAND.

[F] Fill TK-6 to desired level with water from NEUTRALIZATION TANK TK-11 (no higher than 4" from top of the tank).

[2] When the desired level in TK-6 is reached;

[A] CLOSE manual valve MV-961 in T900B.

[B] Place the FILTRATE TRANSFER PUMP TP-11-1 control switch to OFF.

[C] In T900A, CLOSE manual valves MV-938 and MV-999.

[3] On the T900B Control Panel, place the LIME SLURRY TANK Mixer MX-6 control switch to ON.

CAUTION

Liquid level must be above mixer propeller to minimize splashing chemicals. Add sufficient amount of water to tank before energizing mixer.

[4] At control panel in T-900B, place the LIME SYSTEM BLOWER control switch to ON.

[5] In T900B, place a clean plastic bucket on the scale, and measure into the bucket the appropriate amount of hydrated lime for the intended addition. Lime may also be added 50 pounds at a time by pouring the contents of one bag into the hopper. The mixing ratio of hydrated lime to water is approximately 1 pound hydrated lime to 1 gallon of water.

[6] Add the required amount of lime TK-6 (through the lime hopper) to achieve the correct lime solution for the addition process.

[7] Allow mixer in TK-6 to run for 5 minutes to ensure proper mixing.

[8] Clean the lime hopper by scraping the lime into TK-6.

[9] On control panel in T-900B, place the LIME SYSTEM BLOWER control switch to OFF.

[10] **WHEN** blower has been off for at least 60 seconds, **THEN** operate the shaker handle on the side of the bag house for the filter bag six times.

[11] Ensure the mixer MX-6 switch is OFF after sufficient (approximately 5 minutes) mixing time has elapsed.

6.4 Filling Dilute Sulfuric Acid Tank TK-21

Operator

[1] The normal starting operating range for 3% SULFURIC ACID TANK TK-21 is from 8" to 35". **IF** TK-21 is less than 8" full, **THEN** add a sufficient amount of water and concentrated sulfuric acid to bring the tank level to within the normal starting range in accordance with the following;

NOTE 1 *The level indicator for TK-21 is located adjacent to the tank. The maximum working capacity for TK-21 is 163 gallons. (High level = 35 inches; One inch = 4.65 gallons).*

[A] Ensure that there is adequate water (a minimum of 56") in NEUTRALIZATION TANK TK- 11.

[B] Ensure that the following manual valves in T900A are OPEN:
- MV-925
- MV-939

[C] Verify the following manual valves in T900A are CLOSED:
- MV-924
- MV-938
- MV-988
- MV-999

[D] Check the initial level in TK-21 and calculate desired amount of water and acid to add. The concentrated acid and water may be mixed at a ratio of approximately 0.3 gallons concentrated acid to 10 gallons water.

[E] OPEN manual valve MV-9008 (water inlet to TK-21) at 3% SULFURIC ACID TANK TK-21. Water will gravity flow from NEUTRALIZATION TANK TK-11 to TK-21.

[F] Monitor TK-21 level at the local level display at TK-21.

[2] When the desired level in TK-21 is reached;

[A] CLOSE manual valve MV-9008 (water inlet to TK-21).

[B] In T900A, CLOSE manual valve MV-939.

[3] Perform the following to prepare for concentrated acid addition to TK-21:

[A] OPEN manual valves:
- MV-9004 (TK-20 outlet)
- MV-9007 (TK-21 acid inlet)

[B] At TK-20, ensure MV-9015 (20% SULFURIC ACID TANK TK-5 inlet) is CLOSED.

[C] Plug in ACID METERING PUMP MP-20-1 into the 120-volt receptacle located at TK-20.

[D] Place switch for metering pump MP-20-1 to ON, and monitor the tank level in TK-21 at the local level display. Switch is located on the pump.

[4] When the proper amount of sulfuric acid has been transferred to TK-21, place switch for MP-20-1 to OFF.

[5] Unplug ACID METERING PUMP MP-20-1 from the 120-volt receptacle.

[6] CLOSE manual valve MV-9004.

[7] At TK-21, place the toggle switch on motor for mixer MX-21 to ON.

[8] Allow mixer MX-21 to mix TK-21 sufficiently (minimum of 5 minutes), then place switch for MX-21 to OFF.

7.0 POST-PERFORMANCE ACTIVITY

Management of all records is consistent with RM-6.02, Records Identification, Generation, and Transmittal.

Management of Field Logbooks and Forms is consistent with 2-S47-ER-ADM-05.14, Use of Field Logbooks and Forms.

CWTF Responsible Manager

[1] Ensure that the original of the following quality-related records, as appropriate, are transmitted to the RMRS Records Center in accordance RM-6.02, Records Identification, Generation, and Transmittal:

- CWTF Operations Logbook
- Qualification/Training Documentation, as required
- Occurrence Reports, as required

Submission of record copies to the RMRS Records Center will satisfy Administrative Record requirements.

There are no non-quality records generated by this procedure.

Management of all records is consistent with RMRS-DC-6.01, Document Control Program.

8.0 REFERENCES

Rocky Flats Environmental Technology Site, Consolidated Water Treatment Facility Health and Safety Plan, Resource Technology Group, 1995

RMRS-DC-6.01, Document Control Program.

RM-6.02, Records Identification, Generation, and Transmittal

2-S47-ER-ADM-05.14, Use of Field Logbooks and Forms.